

Amendments to the Drawings

The attached sheet of drawings includes changes to Figures 1-18. The sheet that includes Figure 1 now replaces the replacement sheet filed on March 2, 2005 that included Figure 1. In Figure 1, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. In Figure 1, the shape of the boxes have been changed and repositioned for reasons of clarity and stylistic preference. No new matter has been added to Figure 1.

The sheet that includes Figure 1A now replaces the new sheet filed on March 2, 2005 that included Figure 1A. In Figure 1A, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 2/14. No new matter has been added to Figure 1A.

The sheet that includes Figure 1B now replaces the new sheet filed on March 2, 2005 that included Figure 1B. In Figure 1B, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 3/14. No new matter has been added to Figure 1B.

The sheet that includes Figure 2 now replaces the replacement sheet filed on March 2, 2005 that included Figure 2. In Figure 2, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 4/14. No new matter has been added to Figure 2.

The sheet that includes Figures 3 and 4 now replaces the replacement sheet filed on March 2, 2005 that included Figures 3 and 4. The sheet numbering has been fixed to accurately reflect that this is sheet 5/14. No new matter has been added to Figures 3 and 4.

The sheet that includes Figure 5 now replaces the replacement sheet filed on March 2, 2005 that included Figure 5. The sheet numbering has been fixed to accurately reflect that this is sheet 6/14. No new matter has been added to Figure 5.

The sheet that includes Figures 6 and 7 now replaces the replacement sheet filed on March 2, 2005 that included Figures 6 and 7. The sheet numbering has been fixed to accurately reflect that this is sheet 7/14. No new matter has been added to Figures 6 and 7.

The sheet that includes Figure 8 now replaces the replacement sheet filed on March 2, 2005 that included Figure 8. The sheet numbering has been fixed to accurately reflect that this is sheet 8/14. No new matter has been added to Figure 8.

The sheet that includes Figure 9 now replaces the replacement sheet filed on March 2, 2005 that included Figure 9. The sheet numbering has been fixed to accurately reflect that this is sheet 9/14. No new matter has been added to Figure 9.

The sheet that includes Figure 10 now replaces the replacement sheet filed on March 2, 2005 that included Figure 10. In Figure 10, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 10/14. No new matter has been added to Figure 10.

The sheet that includes Figures 11, 12, and 13 now replaces the replacement sheet filed on March 2, 2005 that included Figures 11, 12, and 13. In Figures 11, 12, and 13, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 11/14. No new matter has been added to Figures 11, 12, and 13.

The sheet that includes Figures 14 and 15 now replaces the replacement sheet filed on March 2, 2005 that included Figures 14 and 15. In Figures 14 and 15, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 12/14. No new matter has been added to Figures 14 and 15.

The sheet that includes Figures 16 and 17 now replaces the replacement sheet filed on March 2, 2005 that included Figures 14 and 15. The sheet numbering has been fixed to accurately reflect that this is sheet 13/14. No new matter has been added to Figures 16 and 17.

The sheet that includes Figure 18 now replaces the replacement sheet filed on March 2, 2005 that included Figure 18. In Figure 18, the legends as originally filed have been reincorporated without prejudice and in the interest of furthering prosecution. Additionally, the sheet numbering has been fixed to accurately reflect that this is sheet 14/14. No new matter has been added to Figure 18.

Remarks

Applicants thank the Examiner for the courteous telephone interview held on August 16, 2005 between the Examiner, Jason Sander (54,422), and Jennifer Sickler (36,005). Applicant believe that this response is an accurate reflection of the aforementioned telephone interview.

Claims 1-22 are currently pending in this application, wherein Claims 1-22 are rejected under 35 U.S.C. § 130(a) as being unpatentable over U.S. Pat. No. 5,848,356 ("Garrot") in view of U.S. Pub. No. 2002/00607864 ("Pack") and U.S. Pat. No. 4,689,748 ("Hoffmann"). Applicants' replacement drawings filed on 4/14/05 were not approved, and corrected drawings in compliance with 37 CFR 1.121(d) are required.

A. Corrected Drawings

Applicants have submitted corrected drawings in compliance with 37 CFR 1.121(d). As set forth in the section entitled "Amendments to the Drawings", Applicants have reincorporated the legends, where necessary and as originally disclosed. Additionally, Applicants have corrected the sheet number where necessary. Accordingly, no new matter has been added to the drawings. Therefore, Applicants respectfully request approval of the drawings.

B. 35 U.S.C. § 103(a)

The Office Action admits that the system in Garrot differs from Applicants' claimed invention in that Garrot neither teaches Applicants' claimed imaging array nor Applicants' claimed elevation measurement unit ("EMU"). Accordingly, the Office

Action purports to introduce Hofmann for its disclosure of an imaging array, and Pack for its disclosure of an EMU. Applicants respectfully traverse the position that one of ordinary skill in the art would have been motivated to combine Garrot, Pack, and Hofman. Moreover, Applicants respectfully assert that the combination of Garrot, Pack and Hofman would not work to make their claimed invention.

I. Hofmann's Stereo Line Scanner Neither Teaches Nor Makes Obvious Applicants' Imaging Sensor, Which Generate An At Least Two Dimensional Array Of Pixels

In this response, Applicants have amended their independent Claims 1, 8, and 15 to clarify that their claimed imaging sensors generate an at least two dimensional array of pixels. Support for the amendments is found in paragraphs 16 and 36 and Claim 8 as originally filed.

It is generally known that a line scanner creates successive single rows of pixels. Accordingly, a line scanner works similar to a photocopy machine or a facsimile machine. These single rows of pixels are combined, successively, to create a two dimensional image. Elevation data is required to correct the two dimensional image. Otherwise, for example, given the overhead view of the imaging device, it would be difficult to distinguish a raised roadway from a flat roadway.

Without wishing to be bound by the theory, Applicants believe that in Hofmann the line scanners are used to obtain a one dimensional row of pixels of the same overlapping imaging area. Successive one dimensional rows of pixels are combined to create a two dimensional image. The overlapping stereo imaged area are then used to

calculate the orientation¹ of the device relative to the image it scanned, and a correct image is created. (Hofmann Col. 3, Lines 39-46 and Figs. 1a-4). In this manner, Hofmann discloses a device that computes the relative orientation of itself for each individual line scan period. (Hofmann Col. 3, Lines 39-46).

In the previous response, Applicants amended their claims to an imaging sensor, which generates an array of pixels. However, the Examiner was not persuaded by this amendment because “[a] row of pixels [can be thought of as] a one-dimensional array”. (Final Office Action Page 5, Section 6(B)). Accordingly, in this response Applicants have amended their independent Claims 1, 8, and 15 to clarify that their imaging sensors generate an at least two dimensional array of pixels. This amendment is made in the interest of furthering prosecution, for reasons of clarification, and without prejudice. Therefore, Applicants respectfully assert that the line scanners disclosed in Hofmann—which generate a one dimensional array of pixels—may not fairly be used to teach or make obvious their claimed imaging sensor, which generates an at least two dimensional array of pixels.

II. Hofmann’s Three Line Scanners Operate To Orient The Image Instead Of Using An Attitude Measurement Unit (“AMU”)

Hofmann discloses a method of imaging a terrain using a device. (Hofmann Abstract). Moreover, Hofmann’s method discloses a solution to the problem of orienting the imaged pixels relative to the moving imaging device. (Hofmann Col. 1, Lines 57-63) Hofmann’s method requires knowing the initial coordinates of visible ground reference

¹ Hofmann’s method of orientation teaches away from its combination with Garrot, as explained more fully in this response below.

points and using triangulation to calculate the horizontal and vertical position of its imaging device. (Hofmann Col. 3, Lines 6-7; Col. 3, Lines 12-14; Col 4, Lines 30-33) With this initial orientation complete, Hofmann discloses that it can calculate successive relative image positions via aerial triangulation. (Hofmann Col. 3, Lines 63-67; Col. 4, Lines 18-23).

More specifically, Hofmann's method computes the "relative orientation of stereo line scanner[s] for each individual line scan period by causing the rays defined by a certain number of points ... to intersect or correlate with corresponding image point rays of line image..." (Hofmann Col. 3, Lines 39-46) In other words, the three sensors of Hofmann's device are arranged to form "an exact central perspective geometric relationship". (Hofmann Col. 3, Lines 33-36). With this known geometry, Hofmann can compare successive line scans of known ground coordinates to orient the terrain images relative to the imaging device. (Hofmann Col. 3, Lines 39-46).

Accordingly, Hofmann discloses that an advantage of its system is that it **does not require** "external aids like gyros, bearing-taking or navigational systems" i.e., an AMU. (Hofmann, Col. 1, Lines 63-66; Col. 5, Lines 44-49). "Instead, [Hofmann provides] a purely computational approach ... for determining the orientation data..." (Hofmann Col. 5, Lines 46-49).

In contrast, Applicants' claimed invention does not comprise the use of ground reference points to calculate the position of its imaging array. Instead, **Applicants' claimed invention comprises an AMU** to, *inter alia*, calculate the horizontal and vertical position of each image pixel. (Applicants' Spec. Paragraphs 0009 and 00015; Original Claim 12).

Garrot too incorporates the use of "a vertical gyroscope and magnetometer ... to ... provide the image platform's pitch, roll, and heading data" i.e., device orientation. (Garrot Col. 6, Lines 37-39).

III. Hofmann Teach Away From Combination With Garrot

The prior art must be considered in its entirety, including disclosures that teach away from the claims. (M.P.E.P. § 2141.02). Hofmann discloses that an advantage of its imaging device is the lack of an AMU to orient image data relative to the image device. (Hofmann, Col. 1, lines 63-66; Col. 5, Lines 44-49). The system in Garrot includes an AMU and magnetometer to orient image data relative to the image device. (Garrot Col. 6, Lines 37-39). Accordingly, Hofmann teaches away from combination with Garrot's system—which includes an AMU—to make Applicants' claimed invention—which includes an AMU. Therefore, Applicants respectfully assert that Hofmann cannot be combined with Garrot to form the basis of an obviousness rejection under 35 U.S.C. § 103. (M.P.E.P. § 2145(X)D)(2) stating "it is improper to combine references where the references teach away from their combination", and citing *In Re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983)).

IV. Neither Garrot Nor Pack Disclose Applicants' Claimed Imaging Array

The Final Office Action admits that “the claims further differ [from Garrot] in the structure of the imaging array.” (Final Office Action Page 3, Paragraph 4.A). Further, the Final Office Action admits that the Pack reference was not cited for the use of its digital cameras, which is the imaging system in Pack. (Final Office Action Page 5, Paragraph 6.D).

Thus, Applicants assert that the Examiner has correctly indicated that neither Hofmann nor Pack disclose an imaging array comparable to that of Applicants' independent Claims 1, 8, and 15 or their respective dependencies.

V. Request for Withdrawal Of Rejection Under § 103

In light of the above, Applicants respectfully assert that none of the cited prior art, Garrot, Hofmann, or Pack, serve to render Applicants' claims obvious.

Therefore, Applicants respectfully request that the Examiner withdraw the rejection to claims 1-22 under § 103, and allow the same.

VI. Garrot's Disclosed DEM Is An Embodiment of Applicants' Claimed EMU

Applicants respectfully wish to clarify that Garrot's disclosed DEM is an embodiment of Applicants' claimed EMU. The Final Office Action state that “[w]ith regards to the Pa[c]k reference, this reference was cited for its teaching of incorporating elevation data with image data, not the use of one or more digital cameras *per se*”. Applicants respectfully assert that the Pack reference is not necessary as Garrot discloses the use of “Digital Elevation Maps (DEM) ... to produce ortho-like images conformed to

terrain and tilt-corrected". Applicants' original disclosure specifically states that "elevation data ... may be acquired from either existing Digital Elevation Model (DEM) data sets or collected with the spectral sensor data" i.e., Lidar. (Applicants' Spec., Paragraph 0003).

VII. Real Time v. Post Processing Of Image Data

Applicants respectfully wish to clarify the issue of real time versus post processing of image data. Applicants believe that in light of the above differences between the prior art and their claimed invention, it would be unfair should they be required to amend their claimed invention to either real time or post processing of image data. Accordingly, Applicants respectfully assert that their claimed invention encompasses both processes.

VIII. Request For Continued Examination

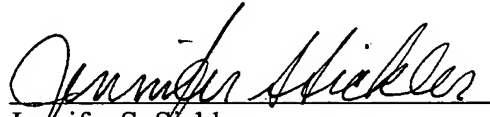
Applicants submit herewith a request for continued examination, and respectfully request reconsideration of the pending claims.

CONCLUSION

In view of the above, Applicants assert that each of the pending claims are in condition for allowance. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection to claims 1-22 under 35 U.S.C. § 103(a), accept the corrected drawings, and allow the pending claims.

Respectfully submitted,

12-8-05
Date


Jennifer S. Sickler
Registration No. 36,005
Attorney for Applicants
GARDERE WYNNE SEWELL LLP
1000 Louisiana Street, Suite 3400
Houston, Texas 77002-5007
(713) 276-5382 (Telephone)
(713) 276-6382 (Facsimile)
E-mail: jsickler@gardere.com

GARDERE WYNNE SEWELL LLP

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GARDERE WYNNE SEWELL LLP

1000 LOUISIANA, SUITE 3400
HOUSTON, TEXAS 77002-5007
(713) 276-5500

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